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(54) BUILDING COMPOSITION AND PULVERULENT AGGREGATE  
"LIGNOPAN B<sub>1</sub>" FOR THE BUILDING COMPOSITION

The invention relates to the building industry and in particular to the production of concrete and mortar mixtures and products based thereon - concretes, reinforced concretes and structures for precast and monolithic construction. The essence of the invention consists in the development of the building composition based on mineral binder, filler, water and complex aggregate which allows physicomechanical parameters of concrete and reinforced concrete products and structures (strength, frost resistance, water imperviousness etc.) to be considerably increased. As modifier, an enzyme preparation - alkaline protease with  $\text{pH} = 9-12$  - is used in the following ratio of components of the mixture in mass%: aqueous solution of technical-grade lignosulfonates - 95-97, alkaline protease with  $\text{pH} = 9-12$  - 5-3, and, as aggregate for the composition, the fraction dried in pseudoliquid layer at  $75-82^{\circ}\text{C}$  and obtained from said mixture and having the molecular weight  $10 \cdot 10^3 - 20 \cdot 10^3$  is used. Various binders and fillers and combinations thereof are also proposed.

7 patent claims and 2 tables.

## DESCRIPTION OF THE INVENTION

The invention relates to the building industry and can be used for the preparation of building compositions, primarily of concrete or mortar mixtures in the production of concrete and reinforced concrete products and structures for precast and monolithic construction, and also in other types of production.

The building composition which comprises the following components (in  $\text{kg/m}^3$ ) is known: Portland cement 450, granite gravel 984, sand 737, water 202 liters and complex aggregate 0.5-0.9% of the mass of the cement. The aggregate is obtained by drying the mixture which comprises the aqueous solution of technical-grade lignosulfonates, sodium sulfate, alkaline modifier - alkali-containing mineral reagent and 50% strength solution of the fatty acid production residues in petroleum spirit in the ratio 1:(0.6-1.5):(0.05:0.15):(0.05-0.1) [1].

The closest analog to the building composition is the building composition which consists of the following components in  $\text{kg/m}^3$ : Portland cement - 430, sand 820, gravel - 960, water 180 liters and pulverulent complex aggregate which comprises the mixture, dried at 200-300°C, of aqueous solution of technical-grade lignosulfonates and of the spent sulfur cleaning solution from gas coking plants based on the fixing salt in the ratio (1-3):(5-10) converted to dry substance [2].

The object of the invention is the development of the building composition using the complex aggregate mentioned above which increases the processability of the concrete mass, and the production of products and structures from the building composition which have increased strength, water imperviousness and frost resistance for a reduced cement consumption.

The object is achieved in that the building composition consists of mineral binder, filler, water and dried pulverulent complex aggregate which comprises the mixture of aqueous solution of technical-grade lignosulfonates and a modifier, where the modifier used is an enzyme preparation - alkaline protease with pH = 9-12 in the following ratio of mixing components in mass%: aqueous solution of technical-grade lignosulfonates 95-97, alkaline protease 5-3 and, as aggregate for the composition, the fraction dried in pseudoliquid layer at 78-82°C and obtained from said mixture and having a molecular weight of  $10 \cdot 10^3$ - $20 \cdot 10^3$  in the following ratio of components of the building composition in kg/m<sup>3</sup>: mineral binder - 300-500, filler - 1250-1790, water - 180-210 liters, said complex aggregate - 0.2-0.7 mass% of the mass of the mineral binder.

Moreover, the building composition can comprise, as binder, Portland cement or slag Portland cement or lime silicate or gypsum cement puzzolan binder and, as filler, gravel of fraction 5-40 mm and sand with the size modulus 1.5-2.5 in the ratio 1.39-2.0 or sand and sand with the size modulus 1.5-2.5.

The set object is also achieved in that, in the complex aggregate for the building composition, which comprises the dried mixture of the aqueous solution of technical-grade lignosulfonates and the modifier, the enzyme preparation, alkaline protease with pH = 9-12 is used in the following ratio of components of the mixture in mass%: aqueous solution of technical-grade lignosulfonates - 95-97, alkaline protease - 5-3, where the fraction with the molecular weight  $10 \cdot 10^3$ - $20 \cdot 10^3$  was obtained from the mixture and dried in pseudoliquid layer at 78-82°C. To prepare the aggregate, the following materials are used: aqueous solution of

technical-grade lignosulfonates (LST) in 50% strength concentration and the enzyme preparation - alkaline protease with pH = 9-12. The aggregate is obtained by mixing technical-grade lignosulfonates with alkaline  
5 protease with pH = 9-12 and subsequent isolation from the resulting mixture with the help of polymer membranes of the fraction with molecular weight  $10 \cdot 10^3$ - $20 \cdot 10^3$  and drying in a pseudoliquid layer at 78-82°C, it being advisable to store the mixture prior to the  
10 fractionation for 4 hours at 40-50°C.

To prepare the building composition - the concrete and mortar composition - Portland cement of the brand 400, gravel of fraction 5-20 mm, sand with size modulus 2.0,  
15 water and complex pulverulent aggregate, which comprises the mixture, dried in a pseudoliquid layer at 78-82°C, of technical-grade lignosulfonates (LST) with alkaline protease in the ratio 95-5 are used, with the fraction with molecular weight  $10 \cdot 10^3$ - $20 \cdot 10^3$  being  
20 obtained from this mixture beforehand and being used.

The compositions of the aggregate for the concrete and mortar mixture and physicommechanical properties are given in tables 1 and 2. The aggregate was assigned the  
25 name "Lignopan B<sub>1</sub>".

Table No. 1

Compositions of the mortar and concrete mixtures

Composi tion  Run No.	Consumption in kg/m <sup>3</sup>			Water, l/m <sup>3</sup>	Cement/ water ratio C/W	Cone settlement, cm	Aggregate - pulverulent mixture of LST and alkaline protease with pH = 10 and molecular weight 10·10 <sup>3</sup> (in mass%
	Cement PC-400, D20	Sand with size modulus 2.0	Gravel of fraction 5- 20 mm				
1.	300	1500	*	200	1.5	5	0.45
2.	430	1370	*	200	2.15	7	0.4
3.	550	1250	*	210	2.6	6	0.35
4.	430	1240	*	230	1.87	6	*
5.	300	790	1100	180	1.66	6	0.5
6.	430	660	1100	180	2.4	5	0.45
7.	550	550	1100	190	2.9	7	0.4
8.	430	555	1150	215	2	5	*
9.	430	605	1100	215	2	17	0.45

Table No. 1

Compositions of the mortar and concrete mixtures

Composi tion  Run No.	Concrete strength at an age of ..., mPa				Cement/ Water ratio C/W	Frost resistance F	Water imperviousness W
	3 days		28 days				
	Heat processing	Normal hardening	Heat processing	Normal hardening			
1.	7.7	9.1	11	13	1.5	100	3
2.	15.5	16.4	21.5	23.5	2.15	150	5
3.	24	25.1	32	33.5	2.6	200	7
4.	12.2	*	17.5	19.5	1.87	100	4
5.	19.6	16.1	28.5	25	1.66	150	4
6.	29.5	29	42.1	41.1	2.4	300	8
7.	34.2	33.3	45.3	44.4	2.9	400	13
8.	21.3	17.5	30.4	25	2	200	6
9.	25	23	33.4	27	2	200	6

CLAIMS

1. A building composition which comprises mineral binder, filler, water and dried pulverulent complex aggregate which comprises the mixture of aqueous solution of technical-grade lignosulfonates and modifier, wherein the modifier used is an enzyme preparation, alkaline protease with pH 9-12 in the following ratio of mixing components in mass%:  
aqueous solution of technical-grade lignosulfonates - 95-97,  
alkaline protease with pH 9-12 - 3-5  
and, as aggregate for the composition, the fraction dried in pseudoliquid layer at 78-82°C and obtained from said mixture and having a molecular weight of  $10 \cdot 10^3$ - $20 \cdot 10^3$  with the following ratio of the components of the building composition in kg/m<sup>3</sup>:  
mineral binder - 300-500,  
filler - 1250-1790,  
water, l/m<sup>3</sup> - 180-210,  
said complex aggregate - 0.2-0.7 mass% of the mass of the mineral binder.
2. The building composition as claimed in claim 1, which comprises Portland cement or slag Portland cement as mineral binder.
3. The building composition as claimed in claim 1, which comprises the lime silicate binder as mineral binder.
4. The building composition as claimed in claim 1, which comprises the gypsum cement puzzolan binder as mineral binder.
5. The building composition as claimed in claim 1, which comprises quartz sand with size modulus



1.5-2.5 as filler.

6. The building composition as claimed in claim 1,  
which comprises the gravel of fraction 5-40 mm and  
5 the quartz sand with size modulus 1.5-2.5 in the  
ratio 1.39-2.0 as filler.
7. A complex aggregate for the building composition  
which comprises the dried mixture of aqueous  
10 solution of technical-grade lignosulfonates,  
wherein the modifier used is the enzyme  
preparation - alkaline protease with pH 9-12 in  
the following ratio of the mixing components in  
mass%:
- 15 aqueous solution of technical-grade  
lignosulfonates - 95-97,  
alkaline protease with pH 9-12 - 5-3,  
where the fraction with molecular weight  
10·10<sup>3</sup>-20·10<sup>3</sup> was obtained from the mixture and  
20 dried in a pseudoliquid layer at 78-82°C.